

## CLAIMS

1. A gas-removing device for removing impurity gases from air to be supplied to a fuel cell via an air supply system, wherein the fuel cell generates electric energy by an electrochemical reaction between a fuel gas and oxygen contained in the air, the gas-removing device comprising:

a porous material having micropores formed therein in order to absorb impurity gas particles contained in the air, the micropores having inner walls; and

an alternate adsorption membrane formed on the inner walls of the micropores of the porous material in order to further adsorb at least one type of impurity gas particles from among the impurity gas particles absorbed by the porous material, the alternate adsorption membrane comprising at least one positively charged layer and at least one negatively charged layer alternately laid together.

2. The gas-removing device as in claim 1, wherein the impurity gas particles adsorbed by the alternate adsorption membrane includes SO<sub>x</sub> gas particles and H<sub>2</sub>S gas particles.

3. The gas-removing device as in claim 1 or 2, wherein the porous material comprises activated carbon fibers.

4. The gas-removing device as in claim 3, wherein the activated carbon fibers are formed into a non-woven fabric.

5. The gas-removing device as in claim 4, further including resin fibers mixed with the activated carbon fibers to form the non-woven fabric.

6. The gas-removing device as in claim 4, further including resin fibers formed into at least two non-woven fabrics, and

wherein the non-woven fabric of the activated carbon fibers is interleaved between the two non-woven fabrics.

7. The gas-removing device as in claim 1 or 2, wherein the porous material comprises activated carbon granules.

8. The gas-removing device as in claim 7, further comprising resin fibers in a form of a non-woven fabric, and

wherein the non-woven fabric of the resin fibers encloses the activated carbon granules.

9. An air supply system comprising:

the gas-removing device as defined in at least one of the preceding claims; and

an air cleaner disposed on an upstream side of the gas-removing device and having a filter element arranged and constructed to remove dust particles from the air; and

a compressor disposed on a downstream side of the gas-removing device and arranged and constructed to compress the air and to supply the compressed air to the fuel cell.

10. The air supply system as in claim 9,

wherein the air cleaner has a housing for accommodating the filter element; and

wherein a sound deadening space is defined in the housing on the downstream side

of the filter element; and

wherein the gas-removing device is disposed within the sound deadening space of the housing.

11. A gas-removing device for removing impurity gasses from air, comprising:

a porous material having micropores formed therein in order to absorb impurity gas particles contained in the air, the micropores having inner walls; and

a membrane formed on the inner walls of the micropores of the porous material in order to selectively chemically adsorb at least one type of specific impurity gas particles from among the impurity gas particles absorbed by the porous material.

12. The gas-removing device as in claim 11, wherein the impurity gas particles to be adsorbed by the membrane include SO<sub>X</sub> gas particles and H<sub>2</sub>S gas particles.

13. The gas-removing device as in claim 11 or 12, wherein the porous material comprises activated carbon fibers.

14. The gas-removing device as in claim 13, wherein the activated carbon fibers are formed into a non-woven fabric.